

PHYSICS FOR SCIENCE & ENGINEERING II

- **Instructor:** Dr. Igor Ostrovskii
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SYLLABUS

Lecture: MTWThF 8:00 a.m. to 9:50 a.m., Room 109 Lewis Hall

❖ **Office Hours:** **MWTh 3:30 – 4:30 p.m. (207 Lewis Hall)**

❖ **Text:** Fundamentals of Physics, 7-th edition, 2005, by David Halliday, Robert Resnik, Jearl Walker; **We will cover Chapters 21 through 36.**

PLEASE, READ THE BOOK.

➤ **Course objectives and goals:**

1. Introduce the physics and engineering major students to General Physics II;
2. Expand an understanding of the ideas of the electricity, magnetism and optics;
3. Develop an understanding of the basis of broad knowledge in physics and electrical engineering;
4. Enhance the critical thinking, analytical reasoning and problem solving skills;
5. Discuss the contemporary problems confronting physics and electrical engineering.

- **Grading Scale:** A's ----- 90 – 100
B's ----- 80 – 89
C's ----- 70 – 79, Etc.

- **EVALUATION:** Grades will be based on the home works, tests, and final examination:

Homework -----	20 %
Two tests -----	40% (#1=20%, #2=20%)
Final exam -----	40 %
	100 %

- **Tests and Final examination schedule:**

• **TEST 1 (CLASS # 17), Chapters 21 - 27 ----- Wednesday, July 12**

• **TEST 2 (CLASS # 31), Chapters 28 - 33 ----- Friday, July 21**

• **FINAL EXAMINATION ----- 8 a.m. on Thursday, July 27, 2006.**

- **Requirements of the course and Homework rules:**

1. Homework is assigned almost every class period and is due at the beginning of the **next** class period.
2. Homework paper should be 8.5 x 11 inches with no torn or tattered edges. Homework papers should be **stapled**.
2. Show all your work; the answer alone is not worth anything. Homework problems must include **enough English** to be understandable.
3. Homework answers should have units and a reasonable number of significant digits.
4. **Circle the finale answers that you want to be graded.**

COURSE CONTENT:

PART I - ELECTRICITY

1. ***ELECTRIC CHARGE*** (Ch. 21) [1.5 hr]
 - Electric charge, Coulomb's Law, Conservation of charge, Charge is quantized.
2. ***ELECTRIC FIELDS*** (Ch. 22) [1.5 hr]
 - Electric field lines, electric field due to different systems of electric charges.

3. *GAUSS' LAW* (Ch. 23) [2 hrs]
 • Flux of an Electric field, Gauss' Law and Coulomb's Law, Applications.
4. *ELECTRIC POTENTIAL* (Ch. 24) & *APPLICATIONS* [2 hrs]
 • Electric potential, electric PE, potential due to different systems of electric charges.
5. *CAPACITANCE* (Ch. 25) [2 hrs]
 • Capacitance, Energy stored in electric field, Dielectrics and Gauss' Law.
6. *CURRENT AND RESISTANCE* (Ch. 26) [3 hrs]
 • Electric current, Resistance, Ohm's Law, Power, Semiconductors.
7. *CIRCUITS* (Ch. 27) [3 hrs] // = 15 hrs
 • Single-Loop circuits, Emf, Ammeter, Voltmeter, RF circuits.
- **TEST 1 (CLASS # 17), Chapters 21 - 27 ----- Wednesday, July 12** [1 hr]

PART II - MAGNETISM

8. *MAGNETIC FIELDS* (Ch. 28) [3 hrs]
 • Production of magnetic field, Hall Effect, Cyclotron, Torque on a current loop.
9. *MAGNETIC FIELDS DUE TO CURRENTS* (Ch. 29) [1 hr]
 • Calculation of magnetic field, Ampere's Law, Solenoids.
10. *INDUCTION AND INDUCTANCE* (Ch. 30) [3 hrs]
 • Faraday's Law, Lenz's Law, Energy of magnetic field, PL circuit.
11. *ELECTROMAGNETIC OSCILLATIONS AND ALTERNATING CURRENT* (Ch. 31) [4 hrs]
 • LC Oscillations, Alternating current, RLC circuit, Transformers.
12. *MAXWELL'S EQUATIONS* (Ch. 32) [3 hr]
 • Gauss' Law for Magnetic field, Displacement current, Maxwell's Equations.
13. *ELECTROMAGNETIC WAVES* (Ch.33) [3 hrs] // = 30 hrs
 • Traveling electromagnetic wave, Pointing vector, Radiation pressure, polarization, reflection, refraction.
- **TEST 2 (CLASS # 31), Chapters 28 - 33 ----- Friday, July 21** [1 hr]

PART III - OPTICS

14. *IMAGES* (Ch. 34) [2 hrs]
 • Mirrors, Lenses, Images, Optical instruments.
15. *INTERFERENCE* (Ch. 35) [2 hrs]
 • Light waves, Coherence, Interference and Diffraction, Michelson's interferometer.
16. *DIFFRACTION* (Ch. 36) [2 hrs]
 • Diffraction by the slit, circular aperture, double slit; Diffracting grating.
17. *REVIEW* (Last class # 38) [1 hr] // = Total 38 hrs
- **FINAL EXAMINATION ----- 8 a.m. on THURSDAY, JULY 27, 2006.** [3 hrs]

- - The dates and hr-schedule are tentative, and may be changed (**but not Final exam!**).